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Lifetime Interpersonal Violence and Self-Reported *Chlamydia trachomatis* Diagnosis among California Women

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Abstract

Objective: To examine the relationship between cumulative exposure to various types of interpersonal violence throughout the life span and self-reported history of *Chlamydia trachomatis* (CT) diagnosis in a population-based sample of California women.

Methods: This was a cross-sectional analysis of a population-based survey of California women aged 18–44 years ($n = 3521$). Participants reported their experience of multiple types of interpersonal violence: physical or sexual abuse in childhood or adulthood and intimate partner violence (IPV) in the past 12 months. Current posttraumatic stress disorder (PTSD) and depressive symptoms were also reported. Separate logistic regression models assessed the association between experiencing each type of interpersonal violence, as well as women's cumulative exposure to violence, and past CT diagnosis, adjusting for age, race/ethnicity, and poverty, as well as mental health problems.

Results: Six percent of women reported a past diagnosis of CT, and 40.8% reported experiencing at least one type of interpersonal violence in their lifetime. All types of violence were significantly associated with higher odds of having a past CT diagnosis even after controlling for sociodemographics. Women who reported experiencing four or more types of violence experiences had over five times the odds of reporting a lifetime CT diagnosis compared with women who never experienced interpersonal violence (adjusted odds ratio = 5.71, 95% CI 3.27-9.58). Current PTSD and depressive symptoms did not significantly affect the relationship between a woman's cumulative experience of violence and her risk of past CT diagnosis.

Conclusions: There is a robust association between experiencing multiple forms of violence and having been diagnosed with CT. Women who seek treatment for sexually transmitted diseases (STDs), such as CT, should be assessed for their lifetime history of violence, especially violence in their current intimate relationships. Sexual risk reduction counseling may also be important for women who have a history of risky sexual behaviors and who are likely to be reinfected.

Introduction

CHLAMYDIA TRACHOMATIS (CT) INFECTION is the most commonly reported bacterial sexually transmitted disease (STD) and the most commonly reported infectious disease in the United States.[1,2] The number of reported cases of CT has increased every year from 1995 to 2005,[2] and the disease is most prevalent among adolescents and young women.[3] Several clinical studies have shown an association between STD diagnosis and exposure to various types of interpersonal violence, including child abuse, adult assault, and intimate partner violence (IPV).[4–10] However, no population-based data have been evaluated to assess the relationship between experiencing multiple types of violence throughout the life span and a widespread STD, such as CT.

Clinical studies indicate that women who have experienced child sexual abuse (CSA) are more likely to be diagnosed with STDs than women who have not experienced interpersonal violence.[4,5,11,12] Indeed, a recent study found that half of the women being treated at an STD clinic reported

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CSA.[13] CSA is associated with less sexual assertiveness, altered risk recognition, increased use of substances during sexual activity, and difficulties with intimacy,[4,11,14–18] which may reduce a woman's protective sexual health behaviors, such as asking a partner about STD status, initiating condom use, and refusing to engage in unwanted sexual activity.[4,19] Other types of adverse childhood experiences, including child physical abuse, have also been associated with increased risk for STDs and greater sexual risk behaviors.[20,21]

Women with a history of child abuse are at greater risk of being victimized again in adolescence or adulthood; this is known as revictimization.[22] Adult trauma has also been associated with greater risk for STD diagnosis, especially for women with abusive partners.[10] Women in violent relationships may find it exceedingly difficult or even impossible to negotiate safer-sex practices with their partners, such as condom use,[23] and evidence suggests that women with a history of IPV tend to have more partners and riskier partners (e.g., men with multiple partners, men infected with an STD, noncondom users) than nonabused women.[7,24–27] Pathways through which adult sexual assault may result in greater risk for STD are similar to those of CSA, and adult physical abuse has also been shown to increase women's likelihood of engaging in risky sexual activities.[28]

Revictimization or multiple experiences of violence may increase a woman's likelihood of having an STD via multiple pathways, including increased sexual risk behaviors, increased contact with other high-risk individuals, and increased risk of experiencing mental health problems associated with trauma.[29] As a woman's exposure to interpersonal violence increases, so does her potential for developing psychological sequelae of trauma, such as posttraumatic stress disorder (PTSD) and depression.[22,30] A few studies have suggested that symptoms of PTSD and depression may be associated with risky sexual behavior and increased risk for STD infection.[31–33] One study reported that symptoms of depression explained, in part, the relationship between exposure to violence and STDs in a sample of HIV-seropositive women.[34] The psychological sequelae of interpersonal violence may interfere with a woman's ability to effectively prevent STD infection. For example, studies have found an association between posttraumatic stress symptoms and dysfunctional beliefs about trust and intimacy among adult survivors of CSA.[14]

The objective of this analysis was to examine the relationship between cumulative exposure to multiple types of interpersonal violence throughout the life span and history of CT diagnosis in a large, representative sample of California women aged 18–44 years. We investigate the separate as well as the cumulative effects of experiencing various types of interpersonal violence and increased likelihood of CT diagnosis, controlling for potential demographic and current mental health problems. Improved detection and treatment of CT may reduce adverse reproductive health outcomes associated with untreated CT[3] and may aid STD prevention activities and promote well-being for women exposed to interpersonal violence. Furthermore, increased identification of women experiencing IPV or other types of interpersonal violence may help women receive the medical and mental health services they need, in addition to appropriate social and economic community resources.

Materials and Methods

The California Women's Health Survey (CWHS)[35] is a population-based, random-digit-dial, annual probability survey of California women sponsored by the California Department of Public Health and designed in collaboration with other state agencies and departments. Interviews are conducted in English and Spanish and take approximately 30 minutes to complete. The response rate for the 2003 survey was 72% and for 2005 was 73%, yielding a total sample of 8029 women aged ≥18 years. The current analysis was restricted to women aged 18–44 years (4372, 54.5%) who had complete data for all study variables (3521, 80.5%). Women with complete data were less likely to be black or Hispanic (chi-square (3) = 117.10, $p < 0.001$) and more likely to have a household income above the federal poverty level (chi-square (1) = 66.55, $p < 0.001$) but did not differ by age (chi-square (2) = 4.80, $p = 0.091$).

The main outcome variable was past history of CT diagnosis; women were asked if a healthcare provider had ever diagnosed them with *Chlamydia*. Survey questions screening for history of child and adult sexual/physical abuse were selected from the Traumatic Stress Schedule, a validated self-report measure of traumatic events.[36] These items assessed sexual abuse and physical abuse in childhood (prior to age 18) and adult physical and sexual assault (age ≥18). IPV items were adapted from the Conflict Tactics Scale.[37] Women were asked if in the last 12 months, an intimate partner or former partner threw something at them; pushed, grabbed, shoved, or slapped them; kicked, bit, or hit them with a fist; beat them up or choked them; forced them to have sex against their will; used a knife on or fired a gun at them; followed or spied on them; caused them to fear for their safety; or tried to control most or all of their daily activities. Women who reported at least one of the preceding items were considered to be exposed to IPV in the last year. The Primary Care (PC)-PTSD Screen,[38] which is composed of four items that assess the major empirically derived factors of PTSD symptoms (reexperiencing, avoidance, hyperarousal, and numbing), was used to assess PTSD symptoms in the past 30 days. Women who endorsed three or more items were considered to have clinically significant PTSD symptoms. Psychometric studies indicate 85% agreement with clinician diagnoses of PTSD using structured, clinical interviews.[38,39] Depression was assessed using an item from the "Healthy Days" measure used in the Brief Behavioral Risk Factor Survey,[40] where women were asked to report on how many of the past 30 days they felt sad, blue, or depressed. Women who reported symptoms ≥14 days of the past month were coded positive for current depression. Women's experiences of multiple violence throughout their life span were attained by adding the number of reports of physical or sexual child abuse, adult physical or sexual assault, and IPV. Cumulative experience of violence was then coded as 0 (no reports of violent experience) through 4 or more violent experiences. Poverty was defined using the federal poverty guidelines.[41]

Statistical analysis

Data were analyzed using SPSS (Windows version 13.0, Chicago, IL). All survey responses and proportions were weighted to reflect the age and ethnicity distributions of Cal-

Table 1. Demographics, Past Exposure to Violence, PTSD, Depression, and Self-Reported *Chlamydia trachomatis* (CD) Diagnosis among California Women Aged 18–44 (n = 3521)

	n (%)
Age, years	
18–24	974 (27.7)
25–34	1282 (36.4)
35–44	1265 (35.9)
Race/ethnicity	
White	1484 (42.1)
African American	190 (5.4)
Hispanic	1231 (35.0)
Asian/other	616 (17.5)
Income below federal poverty level	776 (22.0)
Past interpersonal violence[a]	1436 (40.8%)
Past adult[b] sexual assault	365 (10.4%)
Past adult physical assault	692 (19.7%)
Past child[b] sexual abuse	461 (13.1%)
Past child physical abuse	812 (23.1%)
Intimate partner violence in past year	438 (12.4%)
Posttraumatic stress disorder significant symptoms in past 30 days	263 (7.5%)
Depression in past 30 days	485 (13.8%)
Past diagnosis of CT	214 (6.1%)

[a]Child and/or adult, physical and/or sexual assault/abuse, and/or IPV in last year.
[b]Adult, after age 18; child, before age 18; CT.

ifornia women according to the year 2000 Census. Logistic regression analysis was used to estimate odds ratios (OR) and 95% confidence intervals (CI) for the relationship between each type of interpersonal violence as well as a cumulative index of exposure to multiple types of violence (coded as 0, 1, 2, 3, ≥4) and past diagnoses of CT. Multivariate logistic regression analysis was used to estimate adjusted ORs (AOR), controlling for age, race/ethnicity, and poverty. Finally, we assessed the relationship between cumulative exposures to violence and CT, accounting for mental health problems, specifically current PTSD and depression.

The secondary analysis of survey data for this study was granted exempt status by the Administrative Panel on Human Subjects in Medical Research at Stanford University.

Results

Sample characteristics

Demographics and the prevalence of exposure to interpersonal violence, symptoms of PTSD and depression, and CT diagnosis for the entire sample are provided in Table 1. Two hundred fourteen women (6.1%) reported a past CT diagnosis. Additional analyses (data not shown) revealed that African American women were more than twice as likely to report a past diagnosis of CT compared with white women (OR = 2.45, 95% CI 1.59-3.79). A significant proportion of women surveyed reported experiencing interpersonal violence at some point in their lives (40.8%). Clinically significant PTSD symptoms were reported by 7.5% of women, and 13.8% reported significant depressive symptoms in the past month. Additional analyses revealed that 46.9% (n = 461) of women who reported child abuse (physical or sexual) also reported adult assault (physical or sexual) and that 58.7% (n = 257) of women reporting IPV also reported adult physical or sexual assault.

Exposure to interpersonal violence and past CT diagnosis

The relationship between each type of violence and past CT diagnosis is provided in Table 2. Results of multiple logistic regression models showed that every type of interpersonal violence measured was significantly associated with self-reported past CT diagnosis, even after adjustment for age, race/ethnicity, and poverty. *Post hoc* analyses examined whether the relationship between physical abuse (in childhood or adulthood) was accounted for by experiencing sexual abuse (in childhood or adulthood) using logistic regression models. For the analysis, women were grouped into four categories: experienced sexual violence only, experienced physical violence only, experienced both physical and sexual violence, and experienced no violence. These variables were entered into the same logistic regression equation, and results indicated that all three categories of violent experience, including experiencing physical violence only, were significant at $p < 0.05$. This indicates that sexual abuse does not account for the relationship between lifetime physical abuse and self-reported CT diagnosis.

Cumulative experience of interpersonal violence and past CT diagnosis

Table 3 shows the relationship between the cumulative number of violence experiences and the odds of having a

Table 2. Association of Past Sexual and Physical Violence with Self-Reported Past *Chlamydia trachomatis* (CT)[a] Diagnosis among California Women Aged 18–44 (n = 3521)

		Past CT *diagnosis*					
	n	n	%	*OR*	*95% CI*	*AOR*[b]	*95% CI*
Past adult sexual assault	365	55	15.1	3.37	2.42-4.67	3.43	2.45-4.82
Past adult physical assault	692	83	12.0	2.83	2.12-3.78	2.88	2.14-3.87
Past child sexual abuse	461	58	12.6	2.70	1.96-3.71	2.54	1.84-3.51
Past child physical abuse	812	81	10.0	2.15	1.61-2.86	2.23	1.66-2.99
Intimate partner violence in past year	438	48	11.0	2.16	1.54-3.03	2.14	1.51-3.04

[a]OR, odds ratio; CI, confidence interval; AOR, adjusted odds ratio; adult, after age 18; child, before age 18.
[b]Model adjusted for the following variables: age, race/ethnicity, and poverty.

Table 3. Association of Number of Past Violence Experiences with Self-Reported Past *Chlamydia trachomatis* (CT) Diagnosis among California Women Aged 18–44 (n = 3,521)

				Past CT *diagnosis*					
	n	n	%	*OR*	*95% CI*	*AOR*[a]	*95% CI*	*AOR*[b]	*95% CI*
Number of violent experiences									
None	2,085	68	3.3	1.00		1.00		1.00	
1	690	53	7.7	2.44	1.69–3.54	2.35	1.62–3.42	2.34	1.61–3.41
2	376	37	9.8	3.20	2.11–4.86	3.11	2.04–4.74	3.07	2.00–4.72
3	201	30	14.9	5.27	3.35–8.31	5.18	3.27–8.23	5.06	3.13–8.19
≥4	170	26	15.3	5.33	3.29–8.64	5.71	3.47–9.40	5.59	3.27–9.58

OR, odds ratio; CI, confidence interval; AOR, adjusted odds ratio; adult, after age 18; child, before age 18.
[a]Model adjusted for the following variables: age, race/ethnicity, and poverty.
[b]Model adjusted for the following variables: age, race/ethnicity, poverty, current clinically significant PTSD symptoms, and current depression.

past CT diagnosis. As the number of violent experiences increased, so did the odds of having a past CT diagnosis. Current PTSD or depression did not significantly affect women's cumulative risk for past CT diagnosis, nor did PTSD or depression interact with exposure to violence to influence risk for past CT diagnosis.

Discussion

This study provides the first population-level evidence of the effects of multiple types of violence throughout the life span on women's risk for past CT diagnosis. We found a particularly strong relationship between experiencing multiple forms of violence and an increase in a woman's odds for past CT diagnosis, which was not accounted for by current mental health problems. Although some previous studies using clinical samples found a relationship between STDs and child abuse, adult assault, and IPV, ours was the first study to find a specific relationship between these forms of violence and past CT diagnosis in a nontreatment-seeking population.[4,6,7,9,10,20] Furthermore, the findings from our *post hoc* analysis indicate a general relationship between exposure to interpersonal violence of any kind and past CT diagnosis rather than a specific relationship between sexual assault and past CT diagnosis.

The prevalence rates found in the current study are generally consistent with previous research. For example, the prevalence of exposure to interpersonal violence and PTSD symptoms is similar to what has been reported elsewhere.[42–45] Although there is no comparable estimate of lifetime history of CT infection, a recent study found the point-prevalence of CT diagnosis among women to be 2.5%.[46,47]

The consequences of interpersonal violence may have important implications for the prevention and treatment of STDs. Behavioral factors, such as condom use, discussing STD status with partners, and regular screening, are important in the prevention of CT infection. Risky sexual behaviors, such as having multiple sex partners, not using a condom, and using substances while engaging in sexual activity, are more common among women who have experienced interpersonal violence than those who have not, which may lead to increased risk for and detection of STDs in this subgroup of women.[4,21,27,48] Furthermore, the same behaviors that place women with a history of abuse at higher risk for infection also make it more likely that even if effectively treated, they will be reinfected with CT. However, it is important to emphasize that a woman's partners' sexual health and health risk behaviors also impact the likelihood of her contracting an STD, such as CT. In order for prevention and treatment interventions for women with a history of exposure to interpersonal violence to be effective, they must address these challenges. Interventions that address beliefs and contingencies related to sexual behavior and teach communication skills have been found to be effective in reducing unprotected sex among women exposed to violence.[49]

Our findings support current practice guidelines, which recommend that STD treatment providers screen for IPV.[50] Because of the relationship between IPV and STD risk, current practice guidelines recommend that physicians screen all patients for recent exposure to IPV in healthcare settings where screening and treatment for STDs occur[50]; however, controversy persists about whether there is enough evidence to recommend IPV screening in all healthcare settings.[51,52] Following these guidelines will help identify more women who have experienced IPV, enabling providers to refer victimized women to the appropriate health and social services. Furthermore, it may be beneficial to expand the current standard of care to include recommended screening for lifetime violence, both physical and sexual, as part of a standard sexual risk assessment for women in reproductive healthcare settings. Identifying women who have experienced other forms of interpersonal violence may also improve providers' ability to treat these women for CT. Treatment of current CT infection and prevention of future reinfection for women reporting interpersonal violence will be enhanced by tailoring their treatment plans accordingly.

There are important limitations to the interpretation of these data. The most significant issue is the cross-sectional design, which does not allow us to draw temporal or causal inferences as to the potential mechanisms that may underlie the relationships presented. Particularly important is the possibility that a third factor may be influencing both the high prevalence of interpersonal violence and CT infection. Previous research has found that a variety of socioeconomic factors, such as housing status, income, and neighborhood

factors, are related to both high rates of interpersonal violence and STDs.[53–58] Although we adjusted our analyses for poverty level, it is possible that a more robust measure of socioeconomic status may account for the relationship between high levels of interpersonal violence and past CT infection.

Longitudinal data are needed to elucidate the complex causal relationships among interpersonal violence, socioeconomic status, related mental health problems, and CT infection. In addition, all data on exposures and outcomes were self-reported. We are likely to have underestimated the prevalence of CT, given that many women may be infected with undiagnosed CT as a result of low screening rates in many healthcare settings.[59] Future studies should employ more sensitive and objective measures to examine more fully issues of CT diagnosis among women who have experienced violence and mechanisms of transmission. Finally, our measures of mental health problems are not ideal in that they assess only past month symptoms of depression and PTSD and not lifetime or trauma-specific mental health problems. The exact mechanism by which acute as compared with chronic mental health problems impact health behaviors and STD diagnosis is beyond the scope of this study. Future studies, particularly those longitudinal in nature, may be better able to elucidate the relationship among experiencing violence, subsequent mental health problems, and STD transmission/diagnosis. Importantly, the null findings regarding the impact of mental health problems on the relationship between cumulative violence experiences and past CT diagnosis presented here are subject to cross-sectional design limitations and do not eliminate the possibility that mental health problems may have a more potent immediate effect on CT diagnosis when examined within a shorter time frame to women's traumatic experience.

Conclusions

Despite these limitations, this study presents the first population-level evidence that in addition to recent IPV, exposure to other types of interpersonal trauma throughout the life span is also significantly associated with past CT diagnosis and that the cumulative effects of violence on risk of CT diagnosis are even more substantial than singular exposure to violence. Providers should consider screening for a history of exposure to interpersonal violence throughout the life span to identify women at high risk for CT and other STDs. This approach to interrupting STD transmission and promoting risk reduction to prevent future STD acquisition can be effectively integrated with access to mental health services for past victims of interpersonal violence.

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Disclosure Statement

No competing financial interests exist.

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